DOCUMENT RESUME

ED 160 999 CS 004 426

AUTHOR Jenkins, Joseph R.; And Others
TITLE Vocabulary and Reading Comprehension: Instructional Effects. Technical Report No. 100.
INSTITUTION Bolt, Beranek and Newman, Inc., Cambridge, Mass.; Illinois Univ., Urbana. Center for the Study of Reading.
SPONS AGENCY National Inst. of Education (DHEW), Washington, D.C.
PUB DATE Aug 78
CONTRACT 400-76-0116
NOTE 50p.

EDRS PRICE MF-$0.83 HC-$2.06 Plus Postage.
DESCRIPTORS Average Students; Elementary Education; Intermediate Grades; Learning Disabilities; *Reading Comprehension; *Reading Research; Retarded Readers; *Semantics; *Teaching Methods; *Vocabulary Development; Word Recognition
IDENTIFIERS *Center for the Study of Reading (Illinois)

ABSTRACT

The effects of vocabulary instruction on word knowledge and reading comprehension were assessed in three experiments. In experiment one, employing 12 "average" fourth grade readers, and experiment two, employing six learning disabled intermediate level students, word synonyms were taught to pairs of students on three consecutive days. Experiment three, employing ten fourth grade disabled readers, examined the effect of two to four sessions of vocabulary instruction on comprehension of connected discourse. The three treatments used varied in the amount of direct instruction, ranging from permitting students to infer meanings from context to drilling students on synonyms. Results indicated that the treatments were differentially effective in teaching word synonyms, that with increases in direct instruction more meanings were acquired, and that the treatments produced differential transfer to sentence comprehension. Average students learned some word synonyms under all conditions except a noninstructional control condition; learning disabled students required more direct instruction to produce any learning. Although vocabulary training was found to transfer to comprehension of single sentences, on two of three measures of passage comprehension no effects were observed that could be attributed to vocabulary instruction. (GW)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED160999

U S DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

CENTER FOR THE STUDY OF READING

Technical Report No. 100

VOCABULARY AND READING COMPREHENSION: INSTRUCTIONAL EFFECTS

Joseph R. Jenkins
University of Washington
Darlene Pany
Arizona State University
Janice Schreck
University of Illinois at Urbana-Champaign

August 1978

University of Illinois
at Urbana-Champaign
51 Gerty Drive
Champaign, Illinois 61820

Bolt Beranek and Newman Inc.
50 Moulton Street
Cambridge, Massachusetts 02138

The research reported herein was supported by the National Institute of Education under Contract No. US-NIE-C-400-76-0116. The authors wish to thank the following administrators and teachers for their cooperation in providing students to participate in this research: Marge Stilwell, Hester Suggs, Nancy McDonald, Linda Jenkins, Mary Ann Keith, and Yvette Long. Appreciation is also offered to Kathy Fry, Maureen Baumgartner, Jack Kruidenier, and Peggy Denneau for their assistance in data collection and scoring.

CS004426

Vocabulary and Reading Comprehension: Instructional Effects

Conventional analyses of reading usually include at least three components (Golinkoff, 1975): decoding (word reading), lexical access (retrieving word meanings), and text organization (constructing meanings from units larger than words). The present research focuses on the second two components, individual word meaning, and meaning construction from connected discourse.

As has been noted by Otto, McMenemy, and Brown, "Consensus regarding the need for systematic and extensive vocabulary development is unanimous among authorities in reading instruction; and the need is recognized too by teachers who work with disabled readers" (1973, p. 185). On the empirical side, there is correlational evidence that implicates vocabulary in the reading comprehension process. Readability research and factor analysis studies of reading comprehension are cases in point. In their examination of readability, Chall (1958) and more recently Klare (1974) reported that all quantitative investigations as well as surveys of readers' and experts' opinions showed vocabulary to be related in some degree to the difficulty of reading materials. The single best predictor of readability was some measure of vocabulary load, typically measured by comparing words in a selection of text to word frequency lists (e.g., the Lorge-Thorndike 30,000 most common words or the Dale list of 3,000 familiar words), or by computing word length which is, itself, highly related to word frequency. Thus one measure of passage difficulty is the proportion of infrequent and, presumably, unfamiliar words.

Factor analysis studies conducted to identify the component sub-skills of reading comprehension also lend support to the importance of vocabulary. Davis (1944, 1968) constructed a reading test specifically designed to measure nine presumably distinct comprehension skills. His results revealed five significant factors, one of which was knowledge of word meanings. In fact, Davis and subsequently others (Spearritt, 1972; Thorndike, Note 1) reported that word knowledge and reasoning in reading accounted for virtually all of the variance in comprehension scores.

The most direct evidence of an experimental nature derives from a study by Marks, Doctorow, and Wittrock (1974). They randomly assigned two versions of reading passages to sixth grade students. Fifteen percent of the vocabulary in each passage was manipulated to produce two versions, one with high frequency words and one with low frequency words. Compared with students reading the low frequency versions, those who read the high frequency versions scored significantly better (around 25%) on comprehension questions. Marks et al. attributed this result to differences in the students' knowledge of the high and low frequency vocabularies. They also replicated this finding in a subsequent experiment using the same materials (Wittrock, Marks & Doctorow, 1975).

On the practical side, publishers of standardized reading achievement tests have highlighted the importance of vocabulary. On such popular tests as the Stanford Achievement Test (1970) and the Metropolitan Achievement Test (1970), reading comprehension is partially evaluated by subtests of vocabulary knowledge and by vocabulary questions contained within other subtests (e.g., paragraph meaning). Moreover, authors of

textbooks on the teaching of reading invariably delineate instructional procedures for improving vocabulary, and urge teachers to undertake this type of instruction as a means of enhancing students' reading comprehension (Harris & Sipay, 1975; and Tinker & McCullough, 1962). For example, Spache and Spache stated that "Understanding the vocabulary is second only to the factor of reasoning in the process of comprehension, and some writers would say that it is even more important than reasoning . . . It is sufficient to say that comprehension is significantly promoted by attention to vocabulary growth" (1973, p. 78).

The importance of vocabulary is also stressed by the authors and publishers of basal readers. Lessons in the teacher manuals regularly pinpoint words for vocabulary instruction. Student workbooks provide a variety of additional exercises related to teaching word meanings.

The literature on vocabulary instruction and its relation to reading comprehension is largely descriptive; relatively few training experiments have been conducted which investigate either the absolute or the relative effects of various vocabulary teaching procedures. Furthermore, no investigations have been published which demonstrate that teaching vocabulary to children affects their reading comprehension. Indeed, the few experiments on this issue have found no effects on comprehension, whether it is measured generally with standardized tests (Jackson & Dizney, 1973; Lieberman, 1967) or measured specifically by questions based on passages which included the instructed vocabulary (Pany & Jenkins, 1978).

Against this background, the present set of experiments was designed. One intent of the research was to evaluate teaching procedures frequently

employed to improve vocabulary. Another intent was to determine the generality of these procedures across types of learners (average vs. remedial). A third intent was to examine the effects of various vocabulary instruction procedures on comprehension of sentences and stories that contained the taught vocabulary.

For the first experiment three conditions were devised which varied in the amount of direct instruction provided on word meanings. One condition, Meanings from Context, provided the least direct instruction, though it did provide students with the opportunity to infer word meanings from a specially prepared, "rich" context. The contexts contained synonyms for the unfamiliar words which were embedded in sentences describing a familiar situation. In a second condition, Meanings Given, instruction was more direct; the teacher stated a synonym for each unfamiliar word and provided a sample sentence which used the target word and synonym to describe a familiar situation. The third experimental condition, Meanings Practiced, involved the heaviest emphasis on direct instruction of word meanings. Meanings of unfamiliar words were stated and students were drilled on the words until they mastered them. Example sentences were provided in this condition, as well. It was anticipated that the three instructional conditions would differ not only in their effectiveness in teaching word meanings but also in the extent to which they would influence comprehension of sentences which contained the taught words. Practicing word meanings as compared to being told word meanings was expected to have greater effects on all measures, and both of these procedures were expected to be superior to learning word meanings through context clues alone.

EXPERIMENT 1

Method

Subjects

Twelve fourth grade students, eight females and four males, ages 9-10, participated in the study. The students came from two classrooms and were selected according to their performance on a vocabulary screening test, which is described below. To participate in the experiment students had to read orally at least 75% of the experimental pretest items without error, but correctly identify no more than 10% of the word meanings on the initial screening test. The students had taken the Metropolitan Achievement Test six months prior to the study. Their Word Knowledge subtest scores ranged from 2.9 to 6.7 with a mean of 5.0, and their Reading subtest scores ranged from 2.9 to 8.0 with a mean of 4.4. The Economy Keys to Reading program (1972) and the Macmillan Reading Program (1970) were used in the two classrooms in a traditional group instruction format. At the time of this study, all students were reading in the fourth grade level texts or above. Two students had been placed in a high reading group, six in a middle reading group, and four in a low reading group by their classroom teachers. None of these students were receiving remedial instruction outside their regular classroom program.

Selection of Vocabulary

Sixty-five words that the experimenters judged would be unfamiliar to many fourth grade students were drawn from several fourth grade reading texts--Macmillan (1970), Economy (1972), American Book Company (1972),

Houghton Mifflin (1976), Lippincott (1975), Holt, Rinehart and Winston (1973), and Scott Foresman (1973). With one exception, the words selected were phonetically regular, and were definable by a more familiar one- or two-word synonym. Except for one word which was familiar to 76% of sixth grade students, all synonyms were judged to be familiar to 69% to 93% of fourth grade students according to Dale and O'Rourke (1976).

A 65 item multiple choice vocabulary test was constructed in which each target word preceded four randomly ordered choices: a correct synonym, a randomly selected synonym of another item, and two distractors which had approximately the same frequency of occurrence in elementary school readers as did the correct synonym (Carroll, Davis & Richman, 1971). All choices for each item were the same part of speech. This multiple choice test was administered as a pilot to 10 third and 30 fourth grade students in their classrooms. Every item was read aloud twice by an experimenter as students read along and circled one of the choices.

From these data, the 40 most frequently missed items were used to construct a multiple choice screening test for the experiment. The items were revised so that the synonym distractors were drawn from this reduced pool of 40 words. This screening test was orally administered to all students in the two fourth grade classes. Experimental students were then identified according to the previously stated criteria of 10% or less correct. A final set of 24 target words was selected. No more than two students who were chosen for the study had selected correct synonyms for any single target word. The target words consisted of seven nouns, eight verbs, and nine adjectives.

Design

An incomplete randomized block design was used in which students served as their own controls and participated in all experimental conditions. For six randomly paired students from one classroom, the 24 target words were randomly divided into three groups of eight words each. Word groups were assigned to pairs of subjects and to instructional days according to a randomized Latin Square arrangement. Within each 8-word group, two words were randomly assigned to each of the four experimental conditions. All students received each treatment, with treatment order randomized across pairs of students. For the six students from the second classroom, all randomization was repeated to yield a different set of materials and order of presentation.

Treatment Conditions

In each of the four conditions, two typed words and/or sentences were presented on .076 x .127m index cards. Students read each card silently, then orally, then again silently. Certain treatments required additional experimental procedures; these always occurred following students' oral responses. The treatments are described below.

Meanings from Context. No direct instruction was provided on word meanings. Instead, students read two sentences, the first containing a target word. The second sentence was related to the first and contained a synonym of the target word. For example,

Student reads: "Dan is a real buffoon. He is the funniest clown in the circus."

Meanings given. Students read a sentence containing a target word. Next, the experimenter stated both the meaning of the target word and a sample sentence using the word as the child might hear it in his daily experience. For example,

Student reads: "Dan is a real buffoon."

Experimenter says: "Buffoon means clown. Teachers do not like their students to behave like buffoons or clowns in school."

"Read the sentence again to yourself."

Meanings Practiced. Students read a single target word. The experimanter stated a synonym and a sample sentence using the target word. Students then repeated the target word and the synonym. For example,

Student reads: "buffoon"

Experimenter says: "Buffoon means clown. Your teacher may become angry if you behave like a buffoon in class."

"What does buffoon mean?"

Student 1 says: "Buffoon means clown."

Experimenter says: "What does buffoon mean?"

Student 2 says: "Buffoon means clown."

In this condition, two additional words were presented with the target words so as to increase the task difficulty and to insure that students attended to each word. Students were not told that they would be tested on only the two target words. When all four words had been presented,

they were reviewed and the index cards were shuffled. Then, the experimenter presented all four cards, one at a time. One student read the word and attempted to state its meaning. The experimenter supplied corrective feedback when necessary. This procedure continued until the student had given correct meanings for all four target words on three consecutive trials. The experimenter then repeated this procedure for the second student.

No Meanings Control. Students read the target words, each printed singly on an index card. For example,

Student reads: "buffoon"

Dependent Measures

In all, four separate measurement instruments were constructed; two assessed vocabulary knowledge and two assessed sentence comprehension. The first measure was an Isolated Word Vocabulary Test which consisted of the target words typed in a single column. The student read each word orally and gave its synonym. Responses were recorded by an experimenter. The second vocabulary knowledge measure, the Multiple Choice Vocabulary Test, contained the 24 target words each followed by four randomly arranged choices. The choices were constructed in the same manner as the screening test. Students silently read each item and circled their answer.

In addition, two types of sentence comprehension were tested. For the Sentence Paraphrase Test, a novel sentence was constructed for each target word; e.g., "I think his talk was rational." Students orally read each sentence and attempted to restate the sentence without using the

target word. All responses were recorded. The second sentence comprehension measure was a 96 item Sentence Anomaly Test. Four sentences were generated for each target word so that at least one sentence per target word made sense, i.e., the target word was syntactically and semantically appropriate. At least one sentence did not make sense, i.e., the target word was syntactically incorrect. For example, "Mother put the toys in the garret" was a sensible sentence, and "The garret grew up" was an anomalous sentence. The 96 sentences were printed in random order. Students silently read each sentence and marked a plus (+) if it made sense, a minus (-) if it did not, and a zero (0) if they did not know. Guessing was discouraged. Students received training on the task with non-target items prior to testing.

Scoring and reliability. Each item on both measures of word knowledge was worth one point. For the Sentence Paraphrase Test one point was given for each answer considered to be correct by at least two of three scorers. For the Sentence Anomaly Test, a student had to correctly designate at least three of the four sentences per target word to be awarded one point. All tests were scored independently by three people. Agreement by two of the three was necessary on each item. The three scorers agreed on more than 99% of all test items.

Procedure

For two consecutive days prior to instruction, students came to the experimental room and completed four pretests. On the first day of testing, each student completed the Isolated Word Vocabulary Test and

the Sentence Paraphrase Test with an experimenter. Students were also able to complete approximately half of the Sentence Anomaly Test independently. The remaining half of this test was administered on the second testing day, and was followed by the Multiple Choice Vocabulary Test. Students were instructed to ask the experimenter to supply any words they could not read. As the students worked on the Sentence Anomaly and Multiple Choice Tests, experimenters randomly selected test items for individual students to read orally. Each student's incorrect oral reading responses, combined across all oral tests and orally sampled items of the written tests, were recorded and computed as a measure of oral reading accuracy.[1]

The treatment conditions were introduced one day after completion of the pretesting. Students came to the experimental room in pairs for three consecutive days. Each experimenter taught a different 8-word set to a different pair of students each day. Two words were presented in each of the four treatment conditions every day. Treatments were randomly ordered for each student pair. Time required for the treatment was approximately 45 seconds for Context, 65 seconds for Given, 6 1/2 minutes[2] for Practiced, and 15 seconds for the Control. After three days all 24 words had been presented to each student pair.

Posttests were administered daily following the four treatments. The posttest items were identical to those used in the pretest, however the daily posttests included only those items associated with that day's eight target words. Students were tested individually: one member of each pair began the Sentence Anomaly Test while the experimenter recorded

the other student's oral responses to the Isolated Word and the Sentence Paraphrase tests. The experimenter then tested the first student while the second student wrote answers to the Sentence Anomaly Test. Students completed the Multiple Choice Vocabulary Test last. Throughout each session, students were awarded points for their participation. They then exchanged their points for small tangible reinforcers at the end of each daily session.

To assess retention effects, all students were retested on the two vocabulary tests two weeks after the experiment.

Results

A total score was calculated for each student (N = 12) under each treatment for each of the four immediate tests and the two delayed tests. Scores for individual students ranged from 0 to 6 out of a possible total of 6, i.e., the number of words in each treatment. Both pre and posttest scores were analyzed in a repeated measures randomized block factorial design. Separate two-way analyses of variance, 2(Tests--pre and post) x 4(Treatments), were performed on each dependent variable. Posttest means and standard deviations are displayed in Table 1.

Insert Table 1 about here

Significant overall Test, $F(1,77) > 128.34$, $p < .01$, Treatment, $F(3,77) > 15.30$, $p < .01$, and Test by Treatment interaction, $F(3,77) > 21.45$, $p < .01$, were observed on the four dependent measures given immediately after training. On the two delayed measures, analyses

revealed significant Test, $F(1,77) > 33.21$, $p < .01$, and Test by Treatment interactions, $F(3,77) > 2.76$, $p < .05$.

Tests for simple effects revealed the following. There were no significant pretest differences among Treatment groups, $F(3,77) < 1.38$, $p > .05$, for any dependent variable. In contrast, there were significant posttest differences among the treatments on each dependent variable, $F(3,77) > 4.83$, $p < .01$. Significant pre to posttest differences were not observed for the Control condition on any dependent measure, $F(1,77) < 1.12$, $p > .05$. In general, pre to posttest changes were significant, $F(1,77) > 7.86$, $p < .01$, for all experimental groups on each dependent variable. Exceptions were the two delayed vocabulary tests where pre to posttest differences for the context treatment diminished in size. Specifically, there was no difference on the Isolated Word-Delayed Test, $F(1,77) = 3.52$, $p > .05$, and a difference on the Multiple Choice-Delayed Test, $F(3,77) = 4.76$, $p < .05$.

Tukey HSD contrasts were performed to determine which posttest means differed significantly. In general, Practice means were significantly higher, $p < .01$, than Given means. Exceptions occurred on the Multiple Choice-Delayed Test where practice exceeded Given at only the .05 level of confidence, and on the Isolated Word-Delayed measure, where the differences did not reach significance. With one exception, Practice and Given means exceeded the means of both the Context and Control conditions, $p < .01$. On the Multiple Choice-Delayed Test, Given means did not differ significantly from either Context or Control, $p > .05$. Means of the Context treatment exceeded means of the Control on the Paraphrase measure, $p < .05$,

and on the Isolated Word measure, $p < .05$. Context and Control means did not differ significantly on any other measure.

Discussion

With the few exceptions enumerated above, the treatments were similarly ordered in effectiveness across all dependent measures, with Practice means exceeding Given, which exceeded Context, which in turn exceeded the Control condition. This ordering further reflects the amount of direct instruction provided by a teacher; practice of word meanings involved the greatest amount of direct instruction, giving meanings required less direct instruction, and reading meanings in context required even less teacher-directed instruction. Although the pattern of instructional effects was similar for immediate and delayed tests, the instructional conditions that produced weaker effects on immediate measures were sometimes not differentially effective on the delayed measures. This was especially true when word meanings were acquired through context, in which case performance on delayed tests failed to indicate retention of any meanings. However, the Practice condition which produced the greatest effects on immediate measures also yielded the best retention.

The results indicated that the procedures which were differentially effective in teaching the meanings of single words were also differentially effective in producing transfer to sentence comprehension. Students best comprehended the meaning of sentences that contained words taught in the Practice condition. They comprehended sentences least well when the sentences contained words that had been taught in the Context condition.

EXPERIMENT 2

A second experiment was undertaken to assess the generalizability of the results obtained in Experiment 1 to below-average readers. Specifically, the study sought to examine the relative effectiveness of the three instructional procedures when they were applied to children who were remedial readers.

Method

Subjects

The subjects (N = 6) were four fourth and fifth grade females and two sixth grade males, ages 10-13, all of whom were classified as learning disabled and were receiving reading instruction from a special education resource teacher. The school district classifies as learning disabled those students who test in the normal range on the WISC-R and whose performance is below average in some academic area. Their primary measure to discriminate learning disabled from non-handicapped students is performance on the Developmental Test of Visual-Motor Integration (Beery & Buktenica, 1967). In accordance with school district policy, students' scores on these measures were not available to the experimenters. However, scores on the Stanford Achievement Test (1970) indicated students' reading comprehension as measured by the Paragraph Meaning subtest ranged from 1.1 to 2.6 years below grade level.

The Economy Keys to Reading program (1972) was used in both classroom and resource room instruction. At the time of the experiment, students were receiving instruction in one of the third through sixth grade texts. Instructional placement in a particular text was based on students'

performance on a criterion-refererced, curriculum-based assessment. Daily instruction for these students included approximately 20 minutes of one-to-one oral reading to the resource room teacher followed by oral or written responses to factual comprehension questions drawn from the reading passages. Students had participated in this type of instruction for approximately seven months prior to the experiment. The experiment was conducted in the resource room. All procedures and materials were identical to those used in Experiment 1.

Results

Statistical analyses were identical to those of the first experiment. A total was calculated for each student (N = 6) under each treatment condition for the six dependent measures. Scores for individual students ranged from 0 to 6, out of a possible total of six. Pre and posttest scores were analyzed in a repeated measures randomized block factorial design. Separate 2(Tests) x 4(Treatments) analyses of variance were performed on each dependent variable. Posttest means and standard deviations are displayed in Table 2.

Insert Table 2 about here

Significant overall Test, $F(1,35) > 8.4$, $p < .01$, Treatment, $F(3,35) > 5.1$, $p < .01$, and Test by Treatment interaction, $F(3,35) > 7.6$, $p < .01$, effects were observed on all dependent measures except the two delayed tests of vocabulary knowledge. There were no significant Test, Treatment, or Test x Treatment interaction effects on the Isolated Word-Delayed Test.

On the Multiple Choice-Delayed Test, only the Text x Treatment interaction, $F(3,35) = 3.92$, $p < .05$, was significant.

Tests for simple effects revealed no significant pretest differences among Treatment groups, $F(3,35) < .81$, $p > .10$, on any dependent variable. In contrast, posttest differences among Treatment groups, $F(3,35) > 12.0$, $p < .01$, were highly significant on the four dependent measures given immediately after training. Posttest differences were significant on the Multiple Choice-Delayed Test, $F(3,35) = 5.38$, $p < .05$, but not significant on the Isolated Word-Delayed Test, $F(3,35) = 1.88$, $p > .05$.

Pre to posttest changes were next examined for each treatment group on each dependent variable. No significant gains were observed for either the Control or Context condition on any dependent measure, $F(1,35) < 2.84$, $p > .05$. The Given condition produced significant gains on the Isolated Word, $F(1,35) = 4.86$, $p < .05$, and the Multiple Choice Test, $F(1,35) = 8.16$, $p < .01$. No significant pre to posttest gains were observed for the Given condition on any other measure. With the exception of the Isolated Word-Delayed Test, on which no significant pre to posttest differences were observed, the Practiced condition produced significant pre to posttest gains on all dependent measures, $F(1,35) > 9.72$, $p < .01$.

Tukey's HSD Multiple Comparison Test of pairs of treatments indicated that, in general, only the Practiced means differed significantly from all other treatment means at the .01 confidence level across dependent measures. Exceptions occurred on the Multiple Choice-Delayed Test where Practice exceeded the Control means at only the .05 confidence level, and on the Isolated Word-Delayed measure, where no significant differences

were observed. Given means differed significantly from Context, $p < .05$, on only the two immediate vocabulary measures and the Sentence Paraphrase Test. Significant differences between Given and Control means were observed only on the Isolated Word Test, $p < .01$, and on the Multiple Choice Test, $p < .05$. All other mean differences on all dependent measures were nonsignificant.

Discussion

For the learning disabled readers, the Practice condition appeared to be the most effective instructional procedure for teaching synonyms. The Given condition also produced significant effects on the two vocabulary measures, but its effects were far weaker than those produced by Practice. In fact, performance under Practice exceeded performance under Given by a factor of 3.6 on the Isolated Word measure and by a factor of 2 on the Multiple Choice measure. Context produced no appreciable vocabulary learning with this sample of learners. The strongest procedures in Experiment 1 were also the strongest in Experiment 2. The weakest procedure in Experiment 1 (Context) was not at all effective with the learning disabled students. Compared with the non-handicapped sample of Experiment 1, the learning disabled sample appeared to acquire fewer synonyms under each treatment condition. This was true whether or not students were merely presented with the synonyms (as in the Context and Given conditions) or brought to criterion (as in the Practice condition).

The findings with regard to sentence comprehension were similar to those on the vocabulary measures. The Practice condition produced the

best sentence comprehension and the Context condition the least. Taking both experiments together, there appeared to be rather direct transfer from synonym acquisition to sentence comprehension. Where vocabulary training produced weak effects on vocabulary acquisition (the Context condition in Experiment 1 and the Given condition in Experiment 2) there was little or no transfer to sentence comprehension (to Sentence Paraphrase and Sentence Anomaly, respectively). Retention for the learning disabled sample was depressed compared with the normal sample. Indeed, with the more stringent measure, Isolated Word-Delayed Test, there was virtually a complete loss of training effects. When all measures are considered across both experiments what appears to be an interaction of treatments with learner type may be essentially main effects for learner type and directness of instruction. That is, all students benefited increasingly from increased amount of direct instruction, and normal students required less direct instruction than learning disabled students.

EXPERIMENT 3

The data gathered in the preceding experiments suggests that increased amounts of direct instruction facilitates acquisition of vocabulary, and that acquisition of isolated vocabulary transfers positively to sentence comprehension. The next experiment was designed to learn whether vocabulary training improves passage comprehension. As noted in the introduction, previous attempts to obtain transfer to connected discourse have failed. One explanation for these failures may be that rather weak vocabulary training procedures were employed. Thus, it seemed important to select

a strong vocabulary training procedure for the present experiment. Since the Meanings from Context and Meanings Given conditions were distinctly inferior to the Meanings Practiced condition in the previous two experiments, a decision was made to employ this last treatment so as to maximize the chances of obtaining transfer effects to prose. A standard transfer research paradigm was chosen in which performance on the transfer task, reading comprehension, was compared with and without prior appropriate training.

Method

Subjects

Students participating in this study were ten fourth graders, six male and four female, ages 10-12, who were attending a summer school program for children of economically deprived families. Scores on the Metropolitan Achievement Test indicated students' vocabulary scores were below grade level; the Word Meaning subtest ranged from 1.7 to 5.8 with a median of 3.2. Their comprehension was also deficient; Reading subtest scores ranged from 1.6 to 4.5 with a median of 2.7. No student could correctly define any of the 24 experimental words.

Design

A within subjects design was employed in which students served as their own controls. The 24 target words from the previous experiments were divided into two 12-word sets. Two groups of students were randomly formed so that for one group of students, one set of words served as instructional words and the other set as control words. For the other

group of students, the opposite sets of words were assigned to instructional vs. control conditions. All students were pre and posttested on both sets of words.

Treatment Conditions

In each of the two conditions, all 24 words were printed on index cards. Students were grouped into sets of two or three for instruction. They received practice with the index cards until everyone could read the words with 100% accuracy. After reaching this criterion students began training on one of the two sets of target words.

Synonym Instruction. This experimental procedure was similar to the Practice condition in Experiments 1 and 2. An experimenter showed a printed target word, said the word and a 1-word synonym, then stated a sample sentence containing the word. Each student individually stated the word and its synonym; then the group repeated them in unison. For example,

Experimenter shows printed word and says:	"Debris means trash. After the picnic, we put the debris in the garbage cans."
Student 1 says:	"Debris means trash."
Student 2 says:	"Debris means trash."
Student 3 says:	"Debris means trash."
All students say:	"Debris means trash."

After three words had been presented, the cards were shuffled and the group practiced that subset until each student could provide correct synonyms for all three words on one trial. Then another 3-word subset was

introduced and practiced to criterion in the same manner. Next, these two subsets were combined and practiced until each student could give correct synonyms for all six words. Then the remaining six words were taught in the same way. Finally, all 12 experimental words were combined, and then students were given individual test trials. Practice was terminated when each student gave correct synonyms for one complete trial.

No Instruction Control. Students read only the target word. No synonym instruction was provided.

Dependent Measures

Seven tests were used; two assessed vocabulary knowledge, two assessed sentence comprehension, and three assessed paragraph comprehension. The Isolated Word and Multiple Choice Vocabulary tests used in Experiments 1 and 2 were again used to assess acquisition of word meanings. The Multiple Choice Test was restructured so that the three distractors for each word were synonyms of other randomly selected target words from the same 12-word set. All distractors were of the same part of speech as the correct synonym. Sentence comprehension was measured by the Sentence Paraphrase and Sentence Anomaly tests used in Experiments 1 and 2.

Two stories were written, each of approximately 170 words. Each contained one of the two 12-word sets of target words. Readability levels were in the fifth to sixth grade range as determined by the Dale-Chall Readability formula.

Three sets of tests were constructed to measure students' comprehension of these paragraphs. Students individually completed all tests with an

experimenter who corrected reading errors when necessary, and recorded all responses on a separate test copy. All students received individual instruction on each task prior to test administration.

Cloze Test. Five typed forms of a Cloze Test were derived for each story. The first sentence of the paragraph remained intact. Beginning with either the first, second, third, fourth or fifth word in the second sentence, every subsequent fifth word was deleted and replaced by a 20-space blank. Students orally read one randomly assigned cloze form of the story and supplied as many deleted words as possible, which the examiner wrote down. Cloze Test responses were scored two ways, one with exact word replacements, the other with semantically acceptable replacements. For each scoring, a percent was computed.

Story Retell Test. After they finished reading an intact copy of a story, the students were asked to tell everything they could remember about the story. An initial prompt, "This story was about . . ." was used when necessary. The only other prompt, "Anything else?" was used when a student had paused for several seconds. Retells were tape recorded, and scored later. A propositional analysis (Kintsch, 1974) was made of each story. The number of correct and incorrect propositions recalled was computed on each recall protocol.

Comprehension Questions. An experimenter orally asked ten factual questions about each paragraph. Questions were directed at story details which contained the experimental words. Examples of comprehension questions include:

What did Bill always act like in class?
(a buffoon)

What was Bill pretending to do during arithmetic class?
(vanquish a horde of elephants)

Students' answers were tape recorded and scored later. Each correctly answered comprehension question was awarded one point, yielding a possible total of ten per story.

Procedure

Students came to the experimental room for one-half hour daily. On the two days prior to instruction, students individually completed four pretests: the Isolated Word and Multiple Choice Vocabulary Tests, and the Sentence Paraphrase and Sentence Anomaly Tests. Once instruction began, three groups of students required only two instructional sessions to reach criterion on their 12-word instructional set. The fourth group of students required an additional two days of instruction. Individual posttesting began for students the day after their instructional group reached criterion. First they completed a randomly assigned form of the Cloze Test containing their 12 experimental words, then the entire Isolated Word Vocabulary Test, and finally one-half of the Sentence Paraphrase Test containing the experimental words. The next day, each student read the intact experimental story, performed the Story Retell, and answered the Comprehension Questions. In the time remaining, students completed as many Sentence Anomaly posttest items as possible.

On the following day, students completed a randomly selected form of the Cloze Test for the Control story. They then finished the Sentence

Paraphrase Test for the Control words as well as any remaining Sentence Anomaly items. On the final day, students read the intact Control story, performed the Story Retell, and answered the comprehension questions. Finally, they completed the entire Multiple Choice Vocabulary Test.

Results

A total score was calculated for each student (N = 10) under each treatment condition for the seven dependent measures. Performance on experimental and control passages was compared via *t* tests for dependent samples. Posttest means and standard deviations are displayed in Table 3.

Insert Table 3 about here

Results indicated significant differences between control and experimental means on all vocabulary and sentence comprehension measures. Mean scores were significantly different on the Isolated Word Test, $t(9) = 88.5$, $p < .01$, the Multiple Choice Vocabulary Test, $t(9) = 31.3$, $p < .01$, and the Sentence Anomaly Test, $t(9) = 18.0$, $p < .01$.

However, inspection of the results related to reading comprehension yields a distinctly different impression. Experimental and control treatments produced significant differences on Comprehension Questions, $t(9) = 4.8$, $p < .01$, but not on Story Retell, $t(9) = 1.6$, $p > .25$, or on Cloze, $t(9) < 1$, regardless of the scoring procedure.

Discussion

Synonym practice again proved to be a highly effective procedure for vocabulary teaching, and one that resulted in positive transfer to sentence

comprehension. Indeed, the effects were striking, with students achieving nearly perfect performance on both the vocabulary and the sentence measures. While there was some variation in the instructional time required for students to learn the synonyms, most of the students acquired 12 new vocabulary words in under one hour, and were able to demonstrate their knowledge of these words one day later. It is noteworthy that all of these students were considered to be disabled readers by their schools.

The results of vocabulary instruction on story comprehension are somewhat perplexing. Students did not appear to benefit from their vocabulary knowledge advantage when they read connected discourse. Neither of the more general measures of reading comprehension, Cloze and Story Retell, favored the experimental treatment. The fact that students answered more comprehension questions after receiving vocabulary training might be considered a trivial finding since the answers to questions were themselves target words. Thus, the observed facilitation is potentially accounted for by word familiarization effects rather than by knowledge or meaning effects (Murray & Gillooly, 1967).

GENERAL DISCUSSION

Results of these experiments have demonstrated the differential effectiveness of the three methods of vocabulary instruction. In general, both average and disabled readers learned and retained the greatest number of vocabulary words by a Practice method of instruction. Students learned fewer word meanings when instructors simply told them synonyms; they learned the least number of new word meanings when synonyms were presented

in context. As noted earlier, the relative efficacy of the instructional techniques reflected the differential amounts of direct instruction provided. The greatest amount of direct instruction occurred in the Practice condition which produced the greatest amount of synonym acquisition; the least amount of direct instruction was provided in Context, the least effective procedure. The amount of time given to each instructional procedure is, of course, confounded with the direct instruction variable. Clearly, Practice required the most instructional time and Context the least. However, the time difference between the Given and Context procedures was negligible, and differences in vocabulary learning cannot be accounted for by this factor.

Learner type also appeared to be an important factor. Compared to "normal" readers, learning disabled youngsters required more direct instruction before they evidenced significant vocabulary growth. Whereas the normal readers benefited somewhat from the Context treatments, but rather substantially from the Given treatment, the learning disabled students were unaffected by the Context treatment and only minimally affected by the Given treatment. These results replicate those obtained in earlier research with learning disabled students (Pany & Jenkins, 1978).

Word meaning knowledge did affect students' comprehension of sentences; comprehension of story was also affected when questions were directed at sentences containing the target words. However, vocabulary instruction apparently failed to influence more global comprehension as assessed by Cloze and Retell.

Explanations for this failure to affect reading comprehension fall into two categories. The first might be thought of as "problems with instructional methodology." Possibly, the increased task demands involved in comprehending connected discourse require greater vocabulary facility than that produced by the instructional procedures employed in the present study. The Practice condition was sufficient in helping students comprehend sentences when the students were permitted to study the sentences one at a time; both sentence measures demanded only processing of single unrelated sentences. This task may not demand the speed of lexical access that is required with more normal reading materials, e.g. stories. To help students comprehend longer, more natural discourse selections, however, a different type of vocabulary training may be needed, one that guarantees rapid or automatic lexical access (LaBerge & Samuels, 1974; Perfetti & Lesgold, in press). Perhaps a vocabulary training procedure that went beyond an accuracy criterion, emphasizing speeded synonym retrieval, might be effective in facilitating comprehension.

A second category of explanation for the observed, nonfacilitation of reading comprehension involves the contribution of vocabulary to reading comprehension. Perhaps the presumed importance of vocabulary knowledge (Becker, 1977) has been somewhat overestimated. It may be that readers can tolerate an unexpectedly high proportion of unfamiliar words without suffering comprehension losses. This explanation would seem particularly plausible if the reading passages are ones for which students already possess well developed knowledge structures or schemata. When faced with

passages based on familiar themes, perhaps readers need only to detect sufficient fragments of information to recognize the theme. From this, they then construct the authors' intended meanings based on their own "knowledge recipes" or schemata (Anderson, 1976). In any case, the presence of unfamiliar words in the current passages may not have resulted in the intended disruption of comprehension. Research which addresses the effects of varying densities of unfamiliar words would be useful.

The findings from the three experiments may have implications for instructional practice. Often, teachers devote some time to introducing new vocabulary prior to assigning a reading selection. If the primary intent of this practice is to facilitate their students' comprehension of the forthcoming selection, there may be cause to reexamine this assumption. If the intent of this practice is to help students acquire new vocabulary, then it may be wise to consider a direct instruction format for the vocabulary teaching, especially if the students are unsophisticated or disabled readers.

Reference Notes

1. Thorndike, R. L. Reading as reasoning. Address delivered to Division 15, American Psychological Association, Washington, D.C., September 1971.

References

American Book Co. The Reading, Experience and Development Series. New York: American Book Company, 1971.

Anderson, R. C. The notion of schemata and the educational enterprise. In R. C. Anderson, R. J. Spiro, & W. E. Montague (Eds.), Schooling and the acquisition of knowledge. Hillsdale, N.J.: Erlbaum, 1977.

Becker, W. C. Teaching reading and language to the disabled--What we have learned from field research. Harvard Educational Review, 1977, 47, 518-543.

Beery, K., & Buktenica, N. The Developmental Test of Visual-Motor Integration. Chicago: Follett, 1967.

Chall, J. S. Readability: An appraisal of research and application. Columbus, Ohio: Ohio State University Bureau of Educational Research, 1958.

Carroll, J., Davies, P., & Richman, B. The American heritage word frequency book. New York: Houghton Mifflin, 1971.

Dale, E., & O'Rourke, J. The living word vocabulary. Chicago: Field Enterprises Corp., 1976.

Davis, F. B. Fundamental factors of comprehension in reading. Psychometrika, 1944, 9, 185-197.

Davis, F. B. Research in comprehension on reading. Reading Research Quarterly, 1968, 3, 499-545.

Economy Co. Keys to Reading. Oklahoma City: The Economy Company, 1972.

Golinkoff, R. M. A comparison of reading comprehension processes in good and poor comprehenders. Reading Research Quarterly, 1975, 11, 623-659.

Harris, A. F., & Sipay, E. R. How to increase reading ability (7th ed.). New York: David McKay Co., 1975.

Holt, Rinehart & Winston. The Holt Basic Reading System. New York: Holt, Rirehart & Winston, 1973.

Houghton Mifflin Co. Houghton Mifflin Reading Series. Boston: Houghton Mifflin Co., 1976.

Jackson, J., & Dizney, H. Intensive vocabulary training. Journal of Developmental Reading, 1963, 6, 221-229.

Kintsch, W. The representation of meaning in memory. Potomac, Maryland: Erlbaum, 1974.

Klare, G. R. Assessing readability. Reading Research Quarterly, 1974, 10, 62-102.

LaBerge, D., & Samuels, S. J. Toward a theory of automatic information processing in reading. Cognitive Psychology, 1974, 6, 293-323.

Lippincott Co. Basic Reading. Philadelphia: J. B. Lippincott Co., 1975.

Macmillan Co. The Macmillan Reading Program. New York: Macmillan Co., 1970.

Marks, C. B., Doctorow, M. J., & Wittrock, M. C. Word frequency and reading comprehension. Journal of Educational Research, 1974, 67, 259-262.

Metropolitan Achievement Test. New York: Harcourt, Brace, Jovanovich, 1970.

Murray, F. B., & Gillooly, W. B. The effects of familiarization on reading comprehension. Psychonomic Science, 1967, 8, 431-433.

Pany, D., & Jenkins, J. R. Learning word meanings: A comparison of instructional procedures and effects on measures of reading comprehension with learning disabled students. Learning Disability Quarterly, 1978, in press.

Perfetti, C. A., & Lesgold, A. M. Coding and comprehension in skilled reading and implications for reading instruction. To appear in L. B. Resnick & P. Weaver (Eds.), Theory and practice in early reading. Hillsdale, N.J.: Erlbaum, in press.

Otto, W., McMenemy, R., & Smith, R. J. Corrective and remedial teaching (2nd ed.). Boston: Houghton Mifflin, 1973.

Scott, Foresman & Co. The new open highways. Glenview, Ill.: Scott, Foresman & Co., 1973.

Spache, G., & Spache, E. Reading in the elementary school (3rd ed.). Boston: Allyn & Bacon, 1973.

Spearritt, D. Identification of subskills of reading comprehension by maximum likelihood factor analysis. Reading Research Quarterly, 1972, 8, 92-111.

Stanford Achievement Test. New York: Harcourt, Brace, Jovanovich, 1970.

Tinker, M. A., & McCullough, C. M. Teaching elementary reading. New York: Appleton-Century-Crofts, 1962.

Wittrock, M. C., Marks, C., & Doctorow, M. Reading as a generative process. Journal of Educational Psychology, 1975, 67, 484-489.

Footnotes

The research reported herein was supported by the National Institute of Education under Contract No. US-NIE-C-400-76-0116. The authors wish to thank the following administrators and teachers for their cooperation in providing students to participate in this research: Marge Stilwell, Hester Suggs, Nancy McDonald, Linda Jenkins, Mary Ann Keith, and Yvette Long. Appreciation is also offered to Kathy Fry, Maureen Baumgartner, Jack Kruidenier, and Peggy Denneau for their assistance in data collection and scoring.

[1]No student's reading accuracy fell below the predetermined criterion of 75% correct words.

[2]This figure represents the time required to teach four vocabulary words, only two of which were target words. See Treatment Conditions, Meanings Practiced.

Table 1

Posttest Means and Standard Deviations for the Number Correct on Each Dependent Variable Under Each Treatment Condition for Average Students

	No meanings control	Meanings from context	Meanings given	Meanings practiced
	Mean	Mean	Mean	Mean
Isolated Word	0.42	1.00	2.67	5.00
	(0.51)[a]	(1.21)	(1.44)	(1.21)
Multiple Choice	1.50	2.08	4.33	5.50
	(1.17)	(1.93)	(1.30)	(0.80)
Sentence Anomaly	0.50	1.08	3.58	4.58
	(0.52)	(1.31)	(1.24)	(1.56)
Sentence Paraphrase	0.83	2.17	3.17	5.25
	(0.72)	(1.64)	(1.40)	(0.87)
Isolated Word-Delayed	0.50	0.58	1.33	1.42
	(0.90)	(1.00)	(1.23)	(1.78)
Multiple Choice-Delayed	1.50	1.50	2.25	3.25
	(1.57)	(1.83)	(1.42)	(1.82)

Note. Six is the highest score obtainable.

[a]Standard Deviations

Table 2

Posttest Means and Standard Deviations for the Number Correct on Each Dependent Variable Under Each Treatment Condition for Learning Disabled Students

	No meanings control	Meanings from context	Meanings given	Meanings practiced
	Mean	Mean	Mean	Mean
Isolated Word	0.00	0.17	1.00	3.67
	(0.00)[a]	(0.41)	(0.89)	(1.63)
Multiple Choice	1.00	1.00	2.33	4.67
	(1.09)	(1.09)	(1.21)	(1.21)
Sentence Anomaly	0.00	0.33	0.67	2.83
	(0.00)	(0.82)	(1.21)	(1.83)
Sentence Paraphrase	1.17	0.17	1.33	3.33
	(0.98)	(0.41)	(0.82)	(1.86)
Isolated Word-Delayed	0.00	0.00	0.33	0.50
	(0.00)	(0.00)	(0.52)	(0.84)
Multiple Choice-Delayed	1.00	0.00	0.83	2.33
	(1.26)	(0.00)	(0.41)	(1.63)

Note. Six is the highest score obtainable.

[a]Standard Deviations

Table 3

Posttest Means and Standard Deviations for all Dependent Measures Under Both Treatment Conditions

	Highest possible score	No instruction control Mean	Synonym instruction Mean
Isolated Word Vocabulary Test	12	.1 (.32)[a]	11.9 (.32)
Multiple Choice Vocabulary Test	12	.9 (1.10)	11.8 (.63)
Sentence Anomaly Test	12	.5 (.52)	11.0 (1.56)
Sentence Paraphrase Test	12	.6 (.87)	11.4 (1.07)
Cloze-exact Scoring	100%	33.7% (13.19)	33.3% (13.03)
Cloze-meaning Scoring	100%	53.3% (20.72)	55.0% (16.70)
Story Retell	100%	21.7% (9.73)	28.5% (9.10)
Comprehension Questions	100%	4.20% (1.48)	7.40% (1.78)

[a]Standard Deviations

CENTER FOR THE STUDY OF READING

READING EDUCATION REPORTS

No. 1: Durkin, D. Comprehension Instruction--Where Are You?, October 1977. (ERIC Document Reproduction Service No. ED 146 566, 14p., HC-$1.67, MF-$.83)

No. 2: Asher, S. R. Sex Differences in Reading Achievement, October 1977. (ERIC Document Reproduction Service No. ED 146 567, 30p., HC-$2.06, MF-$.83)

No. 3: Adams, M. J., Anderson, R. C., & Durkin, D. Beginning Reading: Theory and Practice, November 1977.

No. 4: Jenkins, J. R., & Pany, D. Teaching Reading Comprehension in the Middle Grades, January 1978.

No. 5: Bruce, B. What Makes a Good Story?, June 1978.

CENTER FOR THE STUDY OF READING

TECHNICAL REPORTS

* Available only through ERIC

*No. 1: Halff, H. M. Graphical Evaluation of Hierarchical Clustering Schemes, October 1975. (ERIC Document Reproduction Service No. ED 134 926, 11p., HC-$1.67, MF-$.83)

*No. 2: Spiro, R. J. Inferential Reconstruction in Memory for Connected Discourse, October 1975. (ERIC Document Reproduction Service No. ED 136 187, 81p., HC-$4.67, MF-$.83)

*No. 3: Goetz, E. T. Sentences in Lists and in Connected Discourse, November 1975. (ERIC Document Reproduction Service No. ED 134 927, 75p., HC-$3.50, MF-$.83)

*No. 4: Alessi, S. M., Anderson, T. H., & Biddle, W. B. Hardware and Software Considerations in Computer Based Course Management, November 1975. (ERIC Document Reproduction Service No. ED 134 928, 21p., HC-$1.67, MF-$.83)

*No. 5: Schallert, D. L. Improving Memory for Prose: The Relationship Between Depth of Processing and Context, November 1975. (ERIC Document Reproduction Service No. ED 134 929, 37p., HC-$2.06, MF-$.83)

*No. 6: Anderson, R. C., Goetz, E. T., Pichert, J. W., & Halff, H. M. Two Faces of the Conceptual Peg Hypothesis, January 1976. (ERIC Document Reproduction Service No. ED 134 930, 29p., HC-$2.06, MF-$.83)

*No. 7: Ortony, A. Names, Descriptions, and Pragmatics, February 1976. (ERIC Document Reproduction Service No. ED 134 931, 25p., HC-$1.67, MF-$.83)

*No. 8: Mason, J. M. Questioning the Notion of Independent Processing Stages in Reading, February 1976. (Journal of Educational Psychology, 1977, 69, 288-297)

*No. 9: Siegel, M. A. Teacher Behaviors and Curriculum Packages: Implications for Research and Teacher Education, April 1976. (ERIC Document Reproduction Service No. ED 134 932, 42p., HC-$2.06, MF-$.83)

*No. 10: Anderson, R. C., Pichert, J. W., Goetz, E. T., Schallert, D. L., Stevens, K. V., & Trollip, S. R. Instantiation of General Terms, March 1976. (ERIC Document Reproduction Service No. ED 134 933, 30p., HC-$2.06, MF-$.83)

*No. 11: Armbruster, B. B. Learning Principles from Prose: A Cognitive Approach Based on Schema Theory, July 1976. (ERIC Document Reproduction Service No. ED 134 934, 48p., HC-$.206, MF-$.83)

*No. 12: Anderson, R. C., Reynolds, R. E., Schallert, D. L., & Goetz, E. T. Frameworks for Comprehending Discourse, July 1976. (ERIC Document Reproduction Service No. ED 134 935, 33p., HC-$2.06, MF-$.83)

No. 13: Rubin, A. D., Bruce, B. C., & Brown, J. S. A Process-oriented language for Describing Aspects of Reading Comprehension, November 1976. (ERIC Document Reproduction Service No. ED 136 188, 41p., HC-$2.06, MF-$.83)

No. 14: Pichert, J. W., & Anderson, R. C. Taking Different Perspectives on a Story, November 1976. (ERIC Document Reproduction Service No. ED 134 936, 30p., HC-$2.06, MF-$.83)

No. 15: Schwartz, R. M. Strategic Processes in Beginning Reading, November 1976. (ERIC Document Reproduction Service No. ED 134 937, 19p., HC-$1.67, MF-$.83)

No. 16: Jenkins, J. R., & Pany, D. Curriculum Biases in Reading Achievement Tests, November 1976. (ERIC Document Reproduction Service No. ED 134 938, 24p., HC-$1.67, MF-$.83)

No. 17: Asher, S. R., Hymel, S., & Wigfield, A. Children's Comprehension of High- and Low-Interest Material and a Comparison of Two Cloze Scoring Methods, November 1976. (ERIC Document Reproduction Service No. ED 134 939, 32p., HC-$2.06, MF-$.83)

No. 18: Brown, A. L., Smiley, S. S., Day, J. D., Townsend, M. A. R., & Lawton, S. C. Intrusion of a Thematic Idea in Children's Comprehension and Retention of Stories, December 1976. (ERIC Document Reproduction Service No. ED 136 189, 39p., HC-$2.06, MF-$.83)

No. 19: Kleiman, G. M. The Prelinguistic Cognitive Basis of Children's Communicative Intentions, February 1977. (ERIC Document Reproduction Service No. ED 134 940, 51p., HC-$3.50, MF-$.83)

No. 20: Kleiman, G. M. The Effect of Previous Context on Reading Individual Words, February 1977. (ERIC Document Reproduction Service No. ED 134 941, 76p., HC-$4.67, MF-$.83)

No. 21: Kane, J. H., & Anderson, R. C. Depth of Processing and Interference Effects in the Learning and Remembering of Sentences, February 1977. (ERIC Document Reproduction Service No. ED 134 942, 29p., HC-$2.06, MF-$.83)

No. 22: Brown, A. L., & Campione, J. C. Memory Strategies in Learning: Training Children to Study Strategically, March 1977. (ERIC Document Reproduction Service No. ED 136 234, 54p., HC-$3.50, MF-$.83)

No. 23: Smiley, S. S., Oakley, D. D., Worthen, D., Campione, J. C., & Brown, A. L. Recall of Thematically Relevant Material by Adolescent Good and Poor Readers as a Function of Written Versus Oral Presentation, March 1977. (ERIC Document Reproduction Service No. ED 136 235, 23p., HC-$1.67, MF-$.83)

No. 24: Anderson, R. C., Spiro, R. J., & Anderson, M. C. Schemata as Scaffolding for the Representation of Information in Connected Discourse, March 1977. (ERIC Document Reproduction Service No. ED 136 236, 18p., HC-$1.67, MF-$.83)

No. 25: Pany, D., & Jenkins, J. R. Learning Word Meanings: A Comparison of Instructional Procedures and Effects on Measures of Reading Comprehension with Learning Disabled Students, March 1977. (ERIC Document Reproduction Service No. ED 136 237, 34p., HC-$2.06, MF-$.83)

No. 26: Armbruster, B. B., Stevens, R. J., & Rosenshine, B. Analyzing Content Coverage and Emphasis: A Study of Three Curricula and Two Tests, March 1977. (ERIC Document Reproduction Service No. ED 136 238, 22p., HC-$1.67, MF-$.83)

No. 27: Ortony, A., Reynolds, R. E., & Arter, J. A. Metaphor: Theoretical and Empirical Research, March 1977.

No. 28: Ortony, A. Remembering and Understanding Jabberwocky and Small-Talk, March 1977. (ERIC Document Reproduction Service No. ED 137 753, 36 p., HC-$2.06, MF-$.83)

No. 29: Schallert, D. L., Kleiman, G. M., & Rubin, A. D. Analysis of Differences Between Oral and Written Language, April 1977. (ERIC Document Reproduction Service No. ED 144 038 33p., HC-$2.06, MF-$.83)

No. 30: Goetz, E. T., & Osborn, J. Procedures for Sampling Texts and Tasks in Kindergarten through Eighth Grade, April 1977. (ERIC Document Reproduction Service No. ED 146 565, 80p., HC-$4.67, MF-$.83)

No. 31: Nash-Webber, B. Anaphora: A Cross-Disciplinary Survey, April 1977. (ERIC Document Reproduction Service No. ED 144 039, 43p., HC-$2.06, MF-$.83)

No. 32: Adams, M. J., & Collins, A. A Schema-Theoretic View of Reading Comprehension, April 1977. (ERIC Document Reproduction Service No. ED 146 565, 80p., HC-$4.67, MF-$.83)

No. 33: Huggins, A. W. F. Syntactic Aspects of Reading Comprehension, April 1977. (ERIC Document Reproduction Service No. ED 142 972, 68p., HC-$3.50, MF-$.83)

No. 34: Bruce, B. C. Plans and Social Actions, April 1977.

No. 35: Rubin, A. D. Comprehension Processes in Oral and Written Language, April 1977.

No. 36: Nash-Webber, B., & Reiter, R. Anaphora and Logical Form: On Formal Meaning Representations for Natural Language, April 1977. (ERIC Document Reproduction Service No. ED 142 973, 42p., HC-$2.06, MF-$.83)

No. 37: Adams, M. J. Failures to Comprehend and Levels of Processing in Reading, April 1977.

No. 38: Woods, W. A. Multiple Theory Formation in High-Level Perception, April 1977. (ERIC Document Reproduction Service No. ED 144 020, 58p., HC-$3.50, MF-$.83)

No. 40: Collins, A., Brown, J. S., & Larkin, K. M. Inference in Text Understanding, December 1977.

No. 41: Anderson, R. C., & Pichert, J. W. Recall of Previously Unrecallable Information Following a Shift in Perspective, April 1977. (ERIC Document Reproduction Service No. ED 142 974, 37p., HC-$2.06, MF-$.83)

No. 42: Mason, J., Osborn, J., & Rosenshine, B. A Consideration of Skill Hierarchy Approaches to the Teaching of Reading, December 1977.

No. 43: Collins, A., Brown, A. L., Morgan, J. L., & Brewer, W. F. The Analysis of Reading Tasks and Texts, April 1977.

No. 44: McClure, E. Aspects of Code-Switching in the Discourse of Bilingual Mexican-American Children, April 1977. (ERIC Document Reproduction Service No. ED 142 975, 39p., HC-$2.06, MF-$.83)

No. 45: Schwartz, R. M. Relation of Context Utilization and Orthographic Automaticity in Word Identification, May 1977.

No. 46: Anderson, R. C., Stevens, K. C., Shifrin, Z., & Osborn, J. Instantiation of Word Meanings in Children, May 1977. (ERIC Document Reproduction Service No. ED 142 976, 22p., HC-$1.67, MF-$.83)

No. 47: Brown, A. L. Knowing When, Where, and How to Remember: A Problem of Metacognition, June 1977. (ERIC Document Reproduction Service No. ED 146 562, 152p., HC-$8.69, MF-$.83)

No. 48: Brown, A. L., & DeLoache, J. S. Skills, Plans, and Self-Regulation, July 1977. (ERIC Document Reproduction Service No. ED 144 040, 66p., HC-$3.50, MF-$.83)

No. 49: Goetz, E. T. Inferences in the Comprehension of and Memory for Text, July 1977.

No. 50: Anderson, R. C. Schema-Directed Processes in Language Comprehension, July 1977. (ERIC Document Reproduction Service No. ED 142 977, 33p., HC-$2.06, MF-$.83)

No. 51: Brown, A. L. Theories of Memory and the Problems of Development: Activity, Growth, and Knowledge, July 1977. (ERIC Document Reproduction Service No. ED 144 041, 59p., HC-$3.50, MF-$.83)

No. 52: Morgan, J. L. Two Types of Convention in Indirect Speech Acts, July 1977.

No. 53: Brown, A. L., Smiley, S. S., & Lawton, S. C. The Effects of Experience on the Selection of Suitable Retrieval Cues for Studying from Prose Passages, July 1977. (ERIC Document Reproduction Service No. ED 144 042, 30p., HC-$2.06, MF-$.83)

No. 54: Fleisher, L. S., & Jenkins, J. R. Effects of Contextualized and Decontextualized Practice Conditions on Word Recognition, July 1977. (ERIC Document Reproduction Service No. ED 144 043, 37p., HC-$2.06, MF-$.83)

No. 55: Jenkins, J. R., & Larson, K. Evaluating Error Correction Procedures for Oral Reading, June 1978.

No. 56: Anderson, T. H., Standiford, S. N., & Alessi, S. M. Computer Assisted Problem Solving in an Introductory Statistics Course, August 1977. (ERIC Document Reproduction Service No. ED 146 563, 26p., HC-$2.06, MF-$.83)

No. 57: Barnitz, J. Interrelationship of Orthography and Phonological Structure in Learning to Read, August 1977.

No. 58: Mason, J. M. The Role of Strategy in Reading in the Mentally Retarded, September 1977.

No. 59: Mason, J. M. Reading Readiness: A Definition and Skills Hierarchy from Preschoolers' Developing Conceptions of Print, September 1977.

No. 60: Spiro, R. J., & Esposito, J. J. Superficial Processing of Explicit Inferences in Text, December 1977.

No. 61: Spiro, R. J., & Smith, D. Distinguishing Sub-Types of Poor Comprehenders: Overreliance on Conceptual vs. Data-Driven Processes, April 1978.

No. 65: Brewer, W. F. Memory for the Pragmatic Implications of Sentences, October 1977. (ERIC Document Reproduction Service No. ED 146 564, 27p., HC-$2.06, MF-$.83)

No. 66: Brown, A. L., & Smiley, S. S. The Development of Strategies for Studying Prose Passages, October 1977.

No. 68: Stein, N. L., & Nezworski, T. The Effects of Organization and Instructional Set on Story Memory, January 1978.

No. 69: Stein, N. L. How Children Understand Stories: A Developmental Analysis, March 1978.

No. 76: Thieman, T. J., & Brown, A. L. The Effects of Semantic and Formal Similarity on Recognition Memory for Sentences in Children, November 1977.

No. 77: Nash-Webber, B. L. Inference in an Approach to Discourse Anaphora, January 1978.

No. 78: Gentner, D. On Relational Meaning: The Acquisition of Verb Meaning, December 1977.

No. 79: Royer, J. M. Theories of Learning Transfer, January 1978.

No. 80: Arter, J. A., & Jenkins, J. R. Differential Diagnosis-Prescriptive Teaching: A Critical Appraisal, January 1978.

No. 81: Shoben, E. J. Choosing a Model of Sentence Picture Comparisons: A Reply to Catlin and Jones, February 1978.

No. 82: Steffensen, M. S. Bereiter and Engelmann Reconsidered: The Evidence from Children Acquiring Black English Vernacular, March 1978.

No. 83: Reynolds, R. E., Standiford, S. N., & Anderson, R. C. Distribution of Reading Time when Questions are Asked about a Restricted Category of Text Information, April 1978.

No. 84: Baker, L. Processing Temporal Relationships in Simple Stories: Effects of Input Sequence, April 1978.

No. 85: Mason, J. M., Knisely, E., & Kendall, J. Effects of Polysemous Words on Sentence Comprehension, May 1978.

No. 86: Anderson, T. H., Wardrop, J. L., Hively, W., Muller, K. E., Anderson, R. I., Hastings, C. N., & Frederiksen, J. Development and Trial of a Model for Developing Domain Referenced Tests of Reading Comprehension, May 1978.

No. 87: André, M. E. D. A., & Anderson, T. H. The Development and Evaluation of a Self-Questioning Study Technique, June 1978.

No. 88: Bruce, B., & Newman, D. Interacting Plans, June 1978.

No. 89: Bruce, B., Collins, A., Rubin, A. D., & Gentner, D. A Cognitive Science Approach to Writing, June 1978.

No. 90: Asher, S. T. Referential Communication, June 1978.

No. 91: Royer, J. M., & Cunningham, D. J. On the Theory and Measurement of Reading Comprehension, June 1978.

No. 92: Mason, J. M., & Kendall, J. R. Facilitating Reading Comprehension through Text Structure Manipulation, June 1978.

No. 93: Ortony, A., Schallert, D. L., Reynolds, R. E., & Antos, S. J. Interpreting Metaphors and Idioms: Some Effects of Context on Comprehension, July 1978.

No. 94: Brown, A. L., Campione, J. C., & Barclay, C. R. Training Self-checking Routines for Estimating Test Readiness: Generalization from List Learning to Prose Recall, July 1978.

No. 95: Reichman, R. Conversational Coherency, July 1978.

No. 96: Wigfield, A., & Asher, S. R. Age Differences in Children's Referential Communication Performance: An Investigation of Task Effects, July 1978.

No. 97: Steffensen, M. S., Jogdeo, C., & Anderson, R. C. A Cross-Cultural Perspective on Reading Comprehension, July 1978.

No. 98: Green, G. M. Discourse Functions of Inversion Construction, July 1978.

No. 99: Asher, S. R. Influence of Topic Interest on Black Children and White Children's Reading Comprehension, July 1978.

No. 100: Jenkins, J. R., Pany, D., & Schreck, J. Vocabulary and Reading Comprehension: Instructional Effects, August 1978.